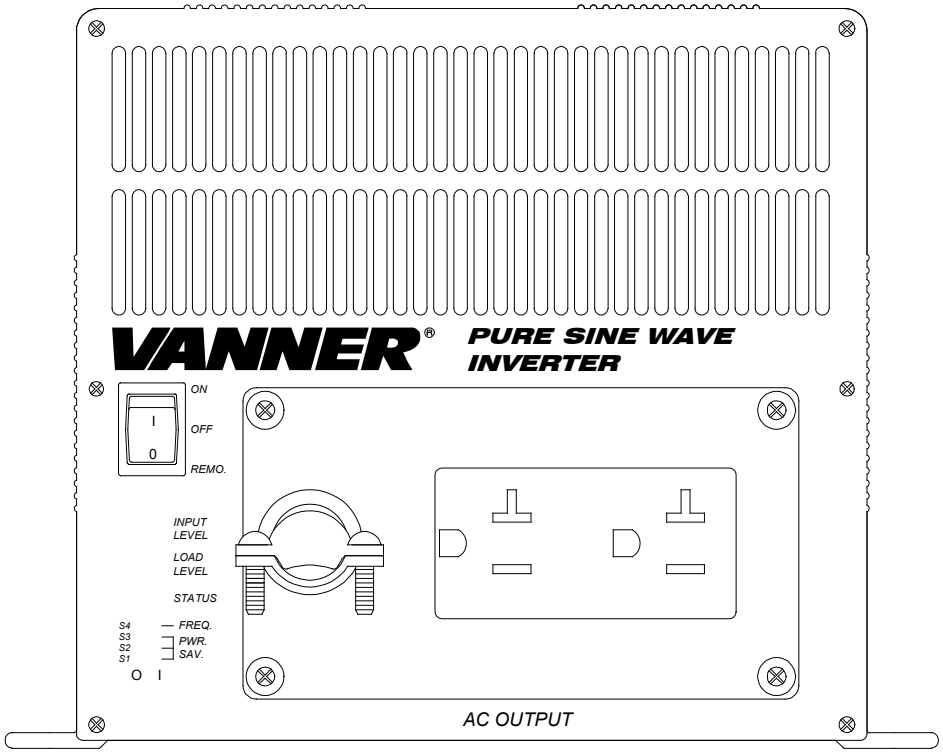
VLT Series
2000/3000 Watt
True Sine Wave Inverter



Models

VLT12-2000 **VLT24-2000**
VLT12-3000 **VLT24-3000**

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1. Important Safety Information

WARNING!

Before using the Inverter, please read and save the safety instructions.

1-1. General Safety Precautions

- Do not expose the inverter to water, mist, snow, spray, or dust.
- To reduce risk of hazard, do not cover or obstruct the ventilation openings.
- Do not install the inverter in a zero-clearance compartment. Overheating may occur.
- To avoid risk of fire and electronic shock, be sure all DC and AC wiring is in good condition and not undersized.
- Do not operate the inverter with damaged or substandard wiring.
- This inverter contains components that can cause arcs and sparks.
- To prevent fire or explosion do not locate flammable materials near the inverter.

1-2. Precautions When Working with Batteries

- If battery acid contacts skin or clothing, wash it off with soap and water immediately. If battery acid contacts your eyes, wash it out with cold running water for at least 20 minutes and get medical attention immediately.
- Never smoke or create sparks or flame in the vicinity of the battery or the engine.
- Do not drop a metal tool on the battery. The resulting spark or short circuit may cause the battery to explode.
- Remove jewelry and personal metal items such as rings, bracelets, necklaces, and watches when working with batteries. Jewelry may cause a short circuit creating very high temperatures which can melt metal items and cause severe burns.

2. Features and Specifications

2-1. Standard Features

- Pure sine wave output (THD < 3%)
- Output frequency□60Hz (50Hz selectable by dip switch)
- Input & output fully isolated design
- Power Saving Mode to conserve energy
- High efficiency 89~94%
- Able to drive highly reactive & capacitive loads
- Tri-Color indicators show input voltage & output load level
- Temperature controlled cooling fan
- Advanced microprocessor
- Protection□ Input low voltage Input over voltage
  Low battery alarm Overload
  Short circuit Over temperature

2-2. Typical AC Loads

2-2-1. Power tools – circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors, etc.

2-2-2. Office equipment – computers, printers, monitors, facsimile machines, scanner, etc.

2-2-3. Household appliances – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.

2-2-4. Kitchen appliances – coffee makers, blenders, ice markers, toasters, etc.

2-2-5. Industrial equipment – metal halide lamp, high – pressure sodium lamp, etc.

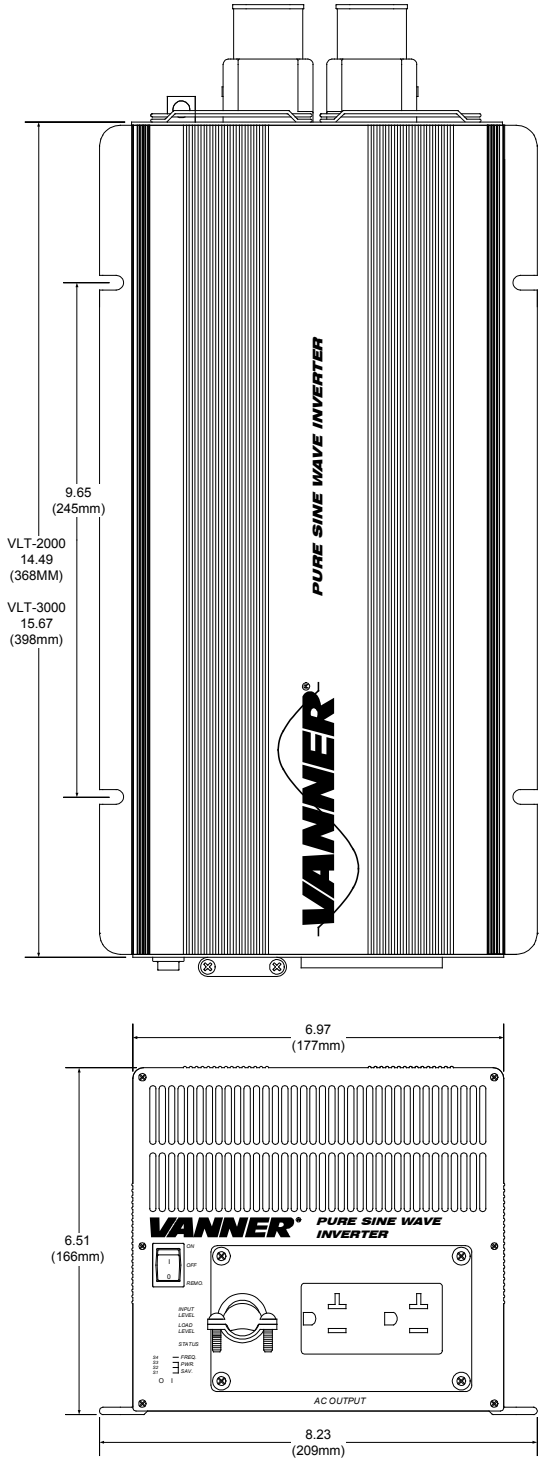
2-2-6. Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment, etc.

2-3. Electrical Performance and Specifications

Specifications	Model Number			
Item	VLT12-2000	VLT24-2000	VLT12-3000	VLT24-3000
Continuous Output Power	2000W		3000W	
Maximum Output Power (3Min.)	2300W		3300W	
Surge Rating	4000W		6000W	
Nominal Input voltage	12V	24V	12V	24V
Output Voltage	120VAC (factory setting) +/- 5% 100/110/115 selectable via internal front panel dip switches			
Output Frequency	60Hz (factory setting) +/- 0.05% 50Hz selectable via front panel dip switch			
Output Waveform	True Sine Wave (THD < 3%)			
Efficiency (full load) MAX	89.0%	92.0%	88.0%	91.0%
No Load Current Draw	2.8A	1.5A	3.0A	1.6A
Stand-By Current Draw	0.60A	0.30A	0.55A	0.35A
Input Voltage Range	10.5-15.0 VDC	21.0-30.0 VDC	10.5-15.0 VDC	21.0-30.0 VDC
Input Level Indicator	Red / Orange / Green LED			
Load Level Indicator				
Failure Indicator	Red LED			
Protection	Overload, Short Circuit, Reverse Polarity (Fuse), Over / Under Input Voltage, Over Temperature.			
Safety Certification	Meets UL458			
EMC	FCC Class A			
Operating Temperature Range	32°F to 104°F (0°C to 40°C)			
Storage Temperature Range	-22°F to 160°F (-30°C to 70°C)			
Cooling	Thermostatically controlled cooling fan			
Dimensions	16.6 L x 8.2 W x 6.5 H		17.8 L x 8.2 W x 6.5 H	
Weight	20 lbs		22 lbs	

Note: Specifications are subject to change without notice.

2-4. Mechanical Drawings

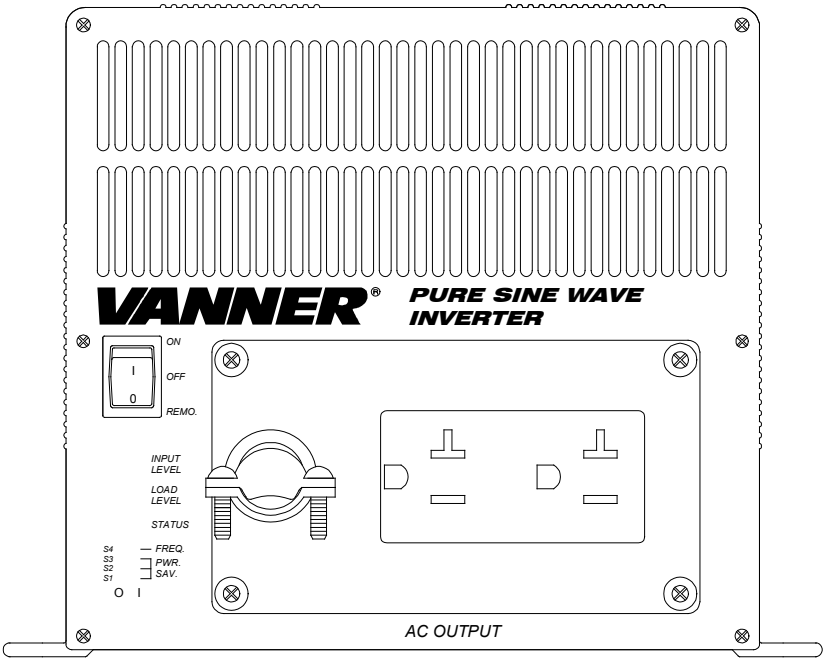


3. Installation and Operation

This inverter is one of the most advanced line of mobile AC power systems. For best performance the inverter must be installed and used properly. Please read this instruction manual before installing and operating the inverter.

3-1. Front Panel Area:

3-1-1. Front view:



3-1-2. ON / OFF/ REMOTE (Main) Rocker Switch:

Before installing the inverter, be sure the main rocker switch is set to "OFF".

3-1-2-1. AC Output Wiring Methods: Three AC output wiring methods are provided.

- GFCI Protected Receptacle
- GFCI Protected Hardwired Output (LOAD terminals on GFCI Receptacle)
- Non-GFCI Hardwired output via terminal strip inside receptacle compartment.

3-1-3. DC Input Voltage Display

LED Status	DC 12V	DC 24V
RED Slow Blink	10.3~10.6	20.5~21.2
RED	10.6~11.0	21.2~21.8
ORANGE	11.0~12.1	21.8~24.1
GREEN	12.1~14.2	24.1~28.6
ORANGE Blink	14.2~15.0	28.6~30.0
OVER RED Blink	Above 15.0	Above 30.0

3-1-4. AC Load Display (Watts)

Unit Power	DARK	GREEN	ORANGE	RED	RED BLINK
2000W	0 ~ 160W	160 ~ 660W	660 ~ 1500W	1500 ~ 1920W	Over 2000W
3000W	0 ~ 240W	240 ~ 990W	990 ~ 2250W	2250 ~ 2880W	Over 3000W

3-1-5. Status:Display Power & Fault Status

Green LED	LED Signal	Status
Solid	▬▬▬▬▬▬▬▬	Power OK
Slow Blink	▬ ▬ ▬ ▬	Power Saving
Red LED	**LED Signal**	**Status**
Fast Blink	▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬	Overvoltage Shutdown
Slow Blink	▬ ▬ ▬ ▬	Undervoltage Shutdown
Intermittent Blink	- - - - - -	Overtemp Shutdown
Solid	▬▬▬▬▬▬▬▬	Overload Shutdown

3-1-6. AC Frequency Selection: AC output frequency is selected by Dip Switch "S4".

Important Note: 60Hz AC loads may be damaged if 50Hz is selected.

The unit must be turned OFF/ON to accept new dip switch settings.

Frequency	S4
50 HZ	OFF (left)
60 HZ	ON (right)

3-1-6-1. AC Voltage Selection: Only qualified persons should change the AC output voltage setting. The AC output voltage is selected by a two-position dip switch located inside the inverter behind the ON/OFF/Remote switch. To access the internal 2-position dip switch, remove the top cover by removing the front four and rear four screws.

The unit must be turned OFF/ON to accept new dip switch settings.

AC Output Voltage	Display Panel internal 2-position DIP Switch Setting	
	Switch 1	Switch 2
120 VAC	ON (up)	ON (up)
115 VAC	ON (up)	OFF (down)
110 VAC	OFF (down)	ON (up)
100 VAC	OFF (down)	OFF (down)

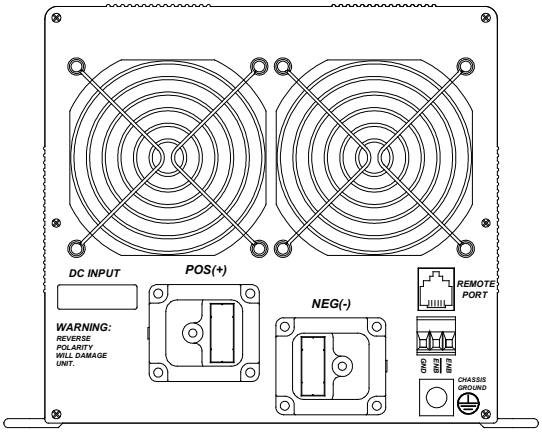
3-1-7. Load Demand (Power Saving Mode): The Load Demand feature allows the inverter to "go to sleep" if the inverter is ON but no AC loads are present. Load Demand is adjustable via Dip Switches S1, S2 and S3 on the front panel. .

Example: With the Load Demand Threshold watt setting at 45W, a load greater than 45W is required to "keep the inverter awake" to produce AC power. If the AC load falls below 45W the inverter will "go to sleep", entering Load Demand power saving mode.

The unit must be turned OFF/ON to accept new dip switch settings.

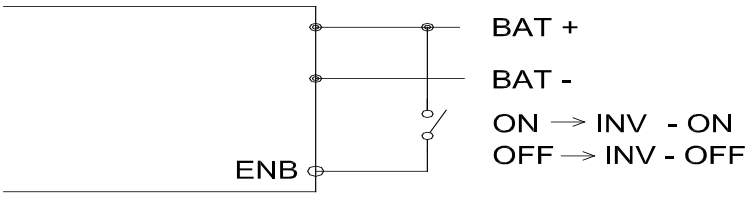
Load Demand Threshold Watts	S1	S2	S3
Load Demand OFF	OFF	OFF	OFF
45W	ON	OFF	OFF
85W	OFF	ON	OFF
130W	ON	ON	OFF
175W	OFF	OFF	ON
220W	ON	OFF	ON
265W	OFF	ON	ON
300W	ON	ON	ON

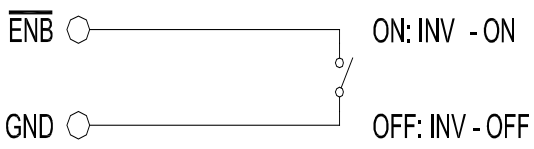
3-2. Rear Panel Area:



3-2-1. Remote Port: The modular jack labeled Remote Port is not used.

3-2-2. Remote Control Connector: (The Remote Control Connector is enabled when the ON/OFF/Remote main rocker switch, located on the front of the inverter, is in the Remote position.) This three-position connector, Phoenix part number 1911868, is labeled GND, ENBBAR, and ENB. Use this connector with a customer supplied SPST switch to provide remote ON/OFF control of the inverter. Remote switch circuit arrangement options are +12v to ENB, or Battery Negative to ENBBAR, or GND to ENBBAR. The most common application (+12v to ENB) uses a +12v hot-in-run from vehicle fuse panel to turn inverter ON when vehicle is ON, and OFF when vehicle is OFF.





3-2-2. Cooling Fans and Ventilation:

Maintain at least 1" clearance all around the inverter at all times.

3-2-3. DC Input Terminals:

Connect DC cables, battery positive (+) to inverter positive (red); battery negative (-) to inverter negative (black). Be aware, there will be a large spark when the last DC connection is made. Be very careful to NEVER connect DC terminals to the inverter backwards (inverter positive to battery negative). Reverse polarity connection may cause permanent damage to the inverter.

Model	DC Input Voltage	
	Minimum	Maximum
12 V	10.5	15.0
24 V	21.0	30.0

3-2-4. Chassis Ground Lug:

Use a # 8 AWG or larger wire to connect inverter chassis ground lug to vehicle chassis.

WARNING!

Operating the inverter without a proper ground connection may cause an electrical hazard.

3-3. Protection Features and Setpoints:

Model	DC Input (VDC)					Over Temperature Protection			
	Over Voltage		Under Voltage Alarm	Under Voltage		INTERIOR		HEAT SINK	
	Shut-down	**Restart**		Shut-down	**Restart**	Shut-down	**Restart**	Shut-down	**Restart**
12 V	**15.3**	**14.3**	**11.0**	**10.2**	**12.7**	**70°**	**45°**	**90°**	**60°**
24 V	**30.6**	**28.8**	**22.0**	**20.3**	**25.2**				

3-4. Installation location:

Install the inverter in an environment that meets the following requirements:

3-4-1. Dry – Do not allow water to drip on or to get inside the inverter.

3-4-2. Cool – Ambient air temperature should be between 32°F and 105°F, the cooler the better.

3-4-3. Safe – Do not install the inverter in a battery compartment or other areas where flammable fumes may exist, such as fuel storage areas.

3-4-4. Ventilated –Maintain at least 1" clearance all around inverter. Be sure ventilation openings on front and back are not obstructed.

3-4-5. Dust free– Do not install the Inverter in dusty environments. Dust will be drawn inside and will greatly shorten the life of the inverter.

3-4-6. Close to batteries but not exposed to battery fumes – Use the recommended wire lengths and sizes (see section 3-5). Avoid excessive cable lengths. Do not install the Inverter in a non-vented compartment with the batteries. Do not mount the Inverter where it will be exposed to the gases produced by the batteries. Battery gases are very corrosive. Prolonged exposure will damage the Inverter.

WARNING! Shock Hazard.

Before proceeding further, verify that the Inverter is NOT connected to batteries, and that all wiring is disconnected from any electrical sources.

NEVER connect the inverter AC output terminals to an incoming AC source.

3-5. DC Wire and Fuse Sizes:

Use the following DC cable and inline fuse sizes. DC cables should be as short as possible (ideally less than 10 feet, never exceeding 20') and large enough to handle the required current in accordance with the electrical codes or regulations applicable to the installation. DC cables that are too small or too long will cause DC voltage drop which will result in deteriorated inverter performance such as poor surge capability and frequent low-input voltage warnings and shutdowns.

Model Number	VLT12-2000	VLT24-2000	VLT12-3000	VLT24-3000
Cable Size	**Distance from battery to inverter in feet** (Length of cable needed is 2 times the distance.)			
1/0	10	20	6	13
2/0	13	26	8	17
3/0	16	33	11	22
4/0	21	42	14	28
250MCM	24	49	16	32
Fuse (Bussmann) Vanner part number	AMG250 013916	AMG175 013913	AMG300 013917	AMG175 013913
Fuse Holder	Vanner part number 012992 (Bussmann FMG Series)			

3-5-1. DC Connections:

When ready to connect DC cables, connect battery positive (+) to inverter positive; connect battery negative (-) to inverter negative. **Be aware, there will be a large spark when the last DC connection is made. This is normal.** **Never connect inverter positive to battery negative.** Be very careful to NEVER connect DC terminals to the inverter backwards. Reverse polarity connection may cause permanent damage to the inverter.

Torque the DC terminal bolts to 9 -12 ft-lbs.

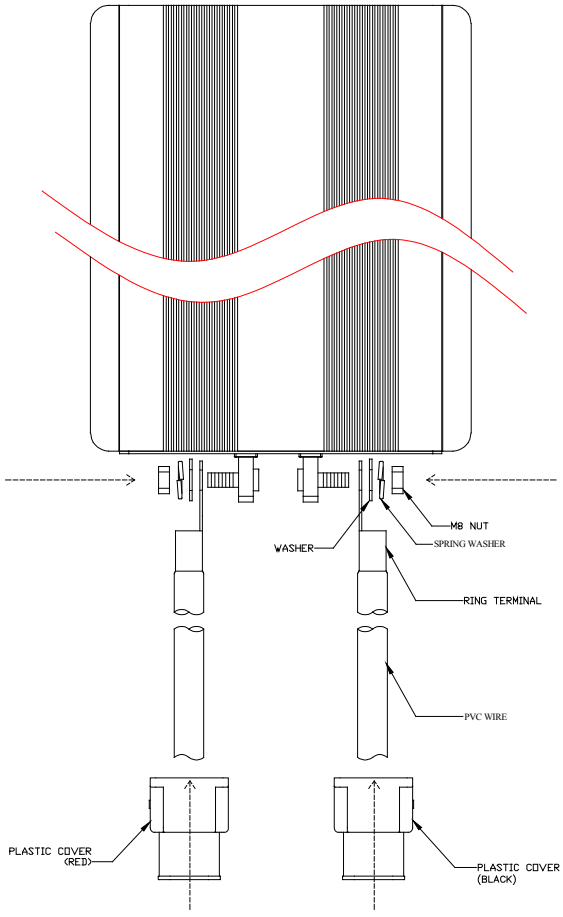
WARNING!

Loose DC connections will overheat and could cause a fire.

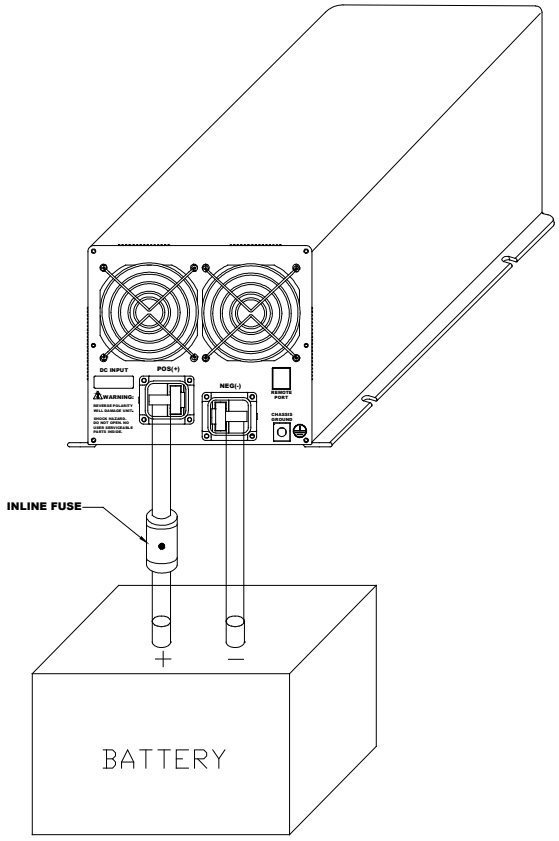
WARNING!

To protect the DC cables, and to protect the inverter if positive and negative are reversed, a DC fuse must be installed in the positive inverter cable within 18" of the battery. Failure to place a fuse in the inverter positive cable will void warranty.

Battery to inverter cable connection



Do not place anything between
battery cable lug and terminal surface.
Assemble exactly as shown.



3-6. AC Neutral Bonding and GFCI's:

3-6-1. AC Neutral Bonding

The neutral conductor of the inverter AC output circuit is connected to ground (the bare wire) inside the inverter. This conforms to National Electrical Code requirements that separately derived AC sources (such as inverters and generators) must have their neutral conductors tied to ground. The AC output ground wire should go to the grounding point for the AC loads; for example, if there is a distribution panel ground bus. Do not connect neutral to ground in any panel, receptacle or device downstream of a GFCI as this would cause the GFCI to trip.

3-6-2. GFCI Receptacles

While the pure sine wave output of the Inverter is equivalent to the waveform provided by utilities, it is possible that some GFCI's may not perform properly on inverter power. If additional GFCI receptacles are needed use Hubbell GFR5252WA or Pass & Seymour 2091 or 2094.

3-7. Inverter Operation:

Use the ON/OFF/REMOTE main rocker switch on the front panel to turn the inverter ON.

3-7-1. Set the rocker switch to the ON position to turn the inverter ON. Notice the beeps and the activity of the indicator light display. The Status led should be green indicating the inverter is ready to deliver AC power to the loads. If multiple AC loads will be operated at the same time it may be necessary to turn the loads ON one-at-a-time to prevent inverter overload due to the initial surge required to start the loads.

3-7-2. Set the rocker switch to the OFF position to turn the inverter OFF.

3-7-3. Set the rocker switch to the REMOTE position if a customer-supplied remote control switch is used with the Remote Control Connector, located on the inverter back panel. (See section 3-2-2.)

4. Troubleshooting

WARNING! There are no user serviceable parts inside the inverter. Do not open or disassemble the inverter to attempt repairs. Attempting to service the unit yourself will expose components that may cause electric shock or fire.

Problems and Symptoms	Possible Cause	Solutions
No AC Output Power		
STATUS LED is RED		
a. Blinking fast	Shutdown for High Input Voltage.	Reduce input voltage.
b. Blinking slowly.	Shutdown for Low Input Voltage.	Recharge battery. Check DC connections. Verify correct cable size.
c. Blinking Intermittently.	Shutdown for Over Temperature.	Improve ventilation. Make sure vent openings are not obstructed. Reduce ambient temperature.
d. Solid ON.	Shutdown for overload, short circuit or wiring error.	Reduce AC load. Check AC wiring for short circuit.

5. Maintenance:

Very little maintenance is required to keep the inverter operating properly. Clean the exterior periodically with a damp cloth to prevent accumulation of dust and dirt. Verify DC connections are all clean and tight.

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